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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,744	07/16/2003	Michael D. Goodner	42P15313	1806

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EXAMINER
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VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 04/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/621,744

Applicant(s)

GOODNER ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 4, 5-8, 10-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Boyd et al (US 6, 221,562)

Boyd discloses an image reversal method. The method comprising the steps of:  
forming a resist layer 102 adjacent a substrate layer 101 and patterning the resist layer to leave discrete resist layer portions and exposed portions of the underlying substrate layer (col 2, lines 62-65)

forming a spin-on-glass layer 103/hardmask layer adjacent the resist layer portions and exposed portions of the underlying substrate layer 101 (col 3, lines 10-15; fig. 1B)

removing a portion of the layer 103/hardmask layer to expose the resist layer portions (col 3, lines 50-53; fig. 1C)

removing the resist layer portions to leave discrete hardmask layer portions separated by patterned trenches, the discrete hardmask layer portions and trenches forming a hardmask pattern (col 4, lines 1-5; fig. 1D)

transferring the hardmask pattern into the underlying substrate layer (col 4, lines 4, lines 11-14)

Regarding claim 2, Boyd discloses the step of spin-coating the resist layer (col 2, lines 65-66)

The limitations of claims 4, 15 have been discussed above

Regarding claim 5, Boyd discloses removing a portion of the hardmask layer 103 by introducing a chemical etchant for a period of time (col 3, lines 52-54)

Regarding claim 7, Boyd discloses the step of stripping/ removing the resist layer portions comprises introducing a wet chemical agent to decompose the resist layer portions (col 4, lines 1-3)

Regarding claims 8, Boyd discloses the step of wherein removing the resist layer portions comprises exposing the resist layer portions to radiation to make them soluble in a developer, and introducing said developer to remove the resist layer portions (col 3, lines 6-9)

Regarding claims 10-11, Boyd discloses the step of etching the substrate with gaseous plasma (col 4, lines 13-24)

Regarding claims 12-13 Boyd discloses the step of spinning the photoresist, the photoresist is used for a radiation wavelength selected from the group of 193 nanometers (col 4, lines 40-42)

Regarding claim 14, Boyd discloses forming a silicon substrate (col 2, lines 63-65)

3. Claims 16-19 are rejected under 35 U.S.C. 102(b) as being anticipated by Boyd et al (US 6, 221,562)

Boyd discloses an image reversal method. The method comprising the steps of:

forming a resist layer 102 adjacent a substrate layer 101 and patterning the resist layer to leave discrete resist layer portions and exposed portions of the underlying substrate layer (col 2, lines 62-65)

forming a spin-on-glass layer 103/hardmask layer adjacent the resist layer portions covering the exposed portions of the underlying substrate layer 101 (col 3, lines 10-15; fig. 1B)

removing the discrete resist layer portions exposing the trench area after forming the hard mask (col 4, lines 1-5, fig. 1D)

removing material from the exposed trench area of the substrate layer to form trench (col 4, lines 11-13; fig. 2)

Regarding claim 17, fig. 1B of Boyd shows the layer 103/hardmask layer covers the resist layer 102 covering a trench area. Boyd also discloses the step of removing a portion of the layer 103/hardmask layer to expose the resist layer portions (col 3, lines 50-53; fig. 1C)

Regarding claim 18, Boyd discloses the step of spinning the photoresist, the photoresist is used for a radiation wavelength selected from the group of 193 nanometers (col 4, lines 40-42)

The limitation of claim 19 has been discussed above

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1765

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boyd et al (US 6, 221,562) in view of Chun (US 6,486,058)

Boyd method has been described above. Unlike the instant claimed invention as per claim 3, Boyd fails to disclose removing portions of the resist layer subsequent to exposing by introducing a chemical developing agent

Chun discloses a method for forming a photoresist comprises the step of removing portions of the resist layer subsequent to exposing by introducing a chemical developing agent of TMAH (col 3, lines 48-50)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Boyd method by adding the step of removing portions of the resist layer subsequent to exposing by introducing a chemical developing agent to provide a photoresist pattern that defines an opening as taught by Chun (col 3, lines 50-52)

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boyd et al (US 6, 221,562) in view of Jang (US 6,194,287)

Boyd method has been described above. Unlike the instant claimed invention as per claim 6, Boyd fails to disclose the step of planarizing the spin-on-glass/hardmask

Jang discloses a method for forming a semiconductor device comprises the step of planarizing the spin-on-glass layer by CMP (col 6, lines 21-24)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Boyd method by adding the step of planarizing the spin-on-glass layer as per Jang because Jang teaches that it is known in the art to polish/planarize trench fill material/spin-on-glass using CMP (col 6, lines 25-26)

7. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Boyd et al (US 6, 221,562) in view of Liu et al (US 6,204,147)

Boyd method has been described above. Boyd differs from the instant claimed invention as per claim 9 by using dry etching to transfer the hardmask/forming a trench into the substrate instead of wet etching

Liu, in a method for manufacturing trench isolation, discloses using wet or dry etching to form a trench in a substrate (col 2, lines 43-44)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Boyd method by using wet etching to transfer the hardmask in view of Liu teaching because Liu discloses that the method of forming trench can be dry etching or wet etching (col 2, lines 42-44)

***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV  
April 11, 2005